

MERCURY ELIMINATION

Jamie Harvie
Institute for a Sustainable Future
Duluth, Minnesota

PROBLEM STATEMENT

Mercury Pollution and the Healthcare Industry

Mercury is a naturally occurring heavy metal that is linked to numerous health effects in wildlife and humans. Mercury is neurotoxic and can damage the central nervous system, especially during fetal and childhood development.

Mercury exposure can cause tremors, impaired vision and hearing, paralysis, insomnia, emotional instability, neurological deficits during fetal development, attention deficit, and developmental delays.¹ Recent studies suggest that mercury may have no threshold below which adverse effects do not occur.

Mercury is a silvery-white liquid at ambient temperature and pressure, though it readily vaporizes and may stay in the atmosphere for up to a year. When released to the air, mercury is moved by global transport processes and deposited around the world. Mercury ultimately accumulates in lake bottom sediments, where it is transformed into a more toxic form, methylmercury, which builds up in fish tissue. Individuals with high methylmercury exposures from frequent fish consumption may have little or no margin of safety. The children of women who consume large amounts of fish and seafood during pregnancy are at highest risk of harm from methylmercury. A recent report estimated that each year about 60,000 children may be born in the United States with neurological problems that could lead to poor school performance because of exposure to methylmercury in utero.”²

Fish consumption advisories due to mercury contamination are in place on thousands of water bodies across

the United States. Forty states have issued advisories on all or some of their lakes, streams and rivers. Mercury levels in the environment have been rising over the last century³ and parallel the rise in industrial activities.

Historically, mercury has been used in the medical setting, because of its uniform response to temperature and pressure changes. Typical uses include sphygmomanometers, laboratory and patient care thermometers and gastro-intestinal devices. Mercury compounds are also in preservatives, fixatives and reagents used extensively in hospital laboratories. Through medical waste incineration, healthcare facilities are recognized as the fourth largest source of mercury to the atmosphere.⁴ Hospitals are also known to contribute approximately 4-5% of the total wastewater mercury load.⁵

Because of the recognition that hospitals contribute significantly to the problem of mercury in the environment, in 1998, a memorandum of understanding was signed by the Environmental Protection Agency and the American Hospital Association. One of the key components of this agreement is to “virtually eliminate” mercury from hospitals by the year 2005.

The Vision: Moving up the Timeline, Mercury-Free by 2003

A variety of hospitals around the country have demonstrated that it is possible to practice mercury-free healthcare. Dana Farber Cancer Institute in Boston and St. Mary's Medical Center in Duluth, Minnesota are two examples. If sufficient resources are made available, the healthcare industry would be able to accomplish the following:

- Eliminate the purchase of any new mercury-containing equipment;

- Provide yearly training on mercury pollution prevention;
- Replace all mercury-containing equipment (sphygmomanometers, laboratory and patient thermometers, and gastrointestinal equipment);
- Eliminate the use of mercury-containing fixatives and reagents;
- Introduce a purchasing procedure that selects for products with the lowest levels of mercury for all hospital purchases with background mercury contamination;
- Replace all mercury-containing pressure gauges on mechanical equipment;
- Powerwash or replace plumbing systems;
- Eliminate the distribution of mercury thermometers to new parents;
- Establish fluorescent bulb and battery recycling programs; and
- Support legislation which prohibits the sale of mercury-containing equipment.

IMPLEMENTATION

All mercury elimination measures need a foundation of strong administrative support and financial resources. If, for example, a mercury reduction initiative is announced, and a mercury elimination taskforce developed, but the administration does not send representatives to taskforce meetings, the mercury reduction initiative will understandably be negatively impacted.

Alternatively, if the administration attends task force meetings but does not champion a budget, the initiative will be similarly impacted. Implementation of the ideal goal is dependent on both of these pillars. Without one or the other; the program will have less chance for success.

Another important success factor is the existence of an environmental “champion” within an institution. Support for these individuals is an excellent way to move a program forward.

Financial resources, administrative commitment and supported environmental champions are the foundation for building a long-term vision and a commitment to the process of employee, institutional and community-wide involvement and education. Education should be aimed at providing an understanding of the adverse impacts of mercury to the environment, public

health, and worker health and safety. Education on mercury-free alternatives is equally important.

Action steps

Initiation of a mercury reduction plan usually begins with an announcement of institutional support, and an invitation for interested employees to be part of a mercury pollution prevention taskforce. A taskforce will provide the most lasting and measurable impacts if it meets regularly and focuses on setting action steps to remove the largest sources of mercury first. The senior decision maker can have a positive impact on the reduction scenarios by providing management support for regular meetings, and financial support for implementation of those action steps necessitating funding. Timing and order of any action steps should be guided by the taskforce, but should include the following:

- Hold a mercury thermometer exchange;
- Provide annual mercury training/spill/labeling program;
- End the distribution of mercury thermometers to new parents and patients;
- End the purchase of new mercury-containing equipment and implement a mercury-free purchasing policy for vendors that includes reagents, and other background uses of mercury;
- Create a replacement plan and budget for elimination of mercury-containing equipment;
- Collect all wastes from processes involving the fixative B5 and designate a team to investigate the use of mercury-free alternatives;
- Set up a fluorescent bulb (and other mercury-containing bulb) recycling program;
- Establish a battery collection program;
- Develop a waste trap cleaning/replacement plan, and
- Implement a labeling and replacement plan for other mercury-containing devices (mechanical equipment).

First Steps

The first step for a mercury reduction team might include the identification of available educational resources, both internal and external to the hospital. Internally, these resources might include medical professionals and environmental services personnel. Externally, state and industry waste management resources are plentiful. Some mercury reduction teams have had early successes due to the order in which they prioritized their initiatives. Mercury sphygmomanometers frequently break and spill, incurring substantial clean-up costs. These might be a priority at one insti-

tution. Another institution may be at risk for wastewater fines for mercury, and here laboratory mercury reductions may be their priority. Different healthcare institutions will have different priorities, but prioritization is a means to achieve early successes.

Using your Group Purchasing Organization (GPO)

Purchasing is one of the most important departments in any hospital mercury reduction initiative. It is where the decisions are made as to what does or does not come into a facility. It is important to recognize that Materials Management is one of the first places to begin implementation of a mercury elimination policy through adoption of a mercury-free purchasing plan (with requisite education and training on mercury-free healthcare for purchasing staff). Yet, the role of purchasing in mercury-free medicine may frequently be subservient to the role of the individual institution's GPO. It is the GPO that offers the products that a hospital purchases. If a GPO offers mercury-containing equipment, or mercury products without disclosure of mercury concentrations, it may be contractually difficult to meet the objectives of an institutional mercury-free policy. The GPO therefore plays an important role in mercury-free healthcare. It is important to recognize this role and use this knowledge to empower hospital management. Hospital management must support the Purchasing Department during GPO contract negotiations, and demand mercury-free products and products with disclosure of mercury concentrations. Hospital management may also have to work collaboratively with other hospitals that use their GPO and together create a voice for mercury-free products. Such leadership will lend support to the GPO to call on manufacturers to disclose mercury concentrations.

Obstacles to Change

Mercury-free medicine is technically feasible, proven by the number of hospitals that have successfully implemented mercury elimination programs. These experiences have helped to identify obstacles and means to circumvent them, making the course that much easier for other hospitals attempting the same goal. Primary obstacles to be expected by the senior decision maker include:

1. LACK OF KNOWLEDGE BASE

The need for education to strengthen the general understanding of all staff on the impacts of mercury on the environment and on the health of hospital employ-

ees, patients and the public has already been emphasized. Education on the life cycle costs of mercury equipment is also extremely important when prioritizing where and when to replace mercury-containing equipment. These costs include hazardous material training, potential clean-up expenses, hazardous waste reporting requirements, and potential wastewater treatment fines.

There is also widespread misunderstanding of the accuracy of mercury-free equipment, especially among medical staff that has been trained on mercury equipment. It is important to educate medical staff on the availability of mercury-free equipment such as thermometers, gastrointestinal devices and sphygmomanometers that offer the same level of accuracy as the mercury product.

These are some of the examples that illustrate the need for an expanded knowledge base concerning mercury reduction and elimination. State and local governments have many conferences and training materials on mercury elimination. The resources provided with this paper should also provide a strong foundation for any mercury reduction initiative.

2. BUDGET

Cost containment is a reality in healthcare, and it may be difficult to defend any budget that includes staff time for mercury pollution prevention and equipment replacement costs (especially for properly functioning mercury-containing equipment). The aforementioned discussion on ancillary costs associated with mercury equipment may be useful. In addition, there are tremendous public relations benefits to any organization that begins a mercury reduction initiative. Mercury thermometer exchanges typically engender tremendous public support. Management interested in implementing a mercury reduction program may use innovative interdepartmental budgeting as it develops its program.

3. TIME

As with all programs, it is important to set and prioritize time for communication and meeting attendance for ongoing mercury pollution prevention task force initiatives. If consideration is not given to time management, it can have a tremendous negative impact on the program. It may be best to delay implementation than to begin and provide minimal attention to the program.

RESOURCES

Eliminating Mercury Use in Hospital Laboratories: A Step toward Zero Discharge: Public Health Reports, July/August 1999 Volume 114 p353-358.

Healing the Harm: Eliminating the Pollution from Healthcare Practices

Mercury Thermometers and Your Family's Health

How to Plan and Hold a Mercury Fever Thermometer Exchange

Making Medicine Mercury Free
Health Care Without Harm, P.O. Box 6806, Falls Church, VA 22040, (703) 237-2249; hcwh@chej.org

Mercury Use in Hospitals and Clinics. 20-minute video and guidebook. Minnesota Office of Environmental Assistance, 520 Lafayette Road N., 2nd Floor, St. Paul, MN 55155; (612) 296-3417; (800) 657-3843.

The case against mercury: Rx for pollution prevention. U.S. Environmental Protection Agency, Region V, Chicago, IL. 1995.

Medical waste pollution prevention. Keep mercury out of the wastewater stream. U.S. Environmental Protection Agency, Region V. Chicago, IL.

Mercury. Western Lake Superior Sanitary District. Duluth, MN.

Blueprint for Mercury Elimination. (38-page book of interest-free) Western Lake Superior Sanitary District ; 218-722-3336

INTERNET SITES

Health Care Without Harm, www.noharm.org.

Strategies to Achieve AHA's Vision of Healthy Communities, www.h2e-online.org

University of Massachusetts Lowell Sustainable Hospitals Project, www.sustainablehospitals.org

Reducing Mercury in Healthcare, Promoting a Healthier Environment
Monroe County, New York, Department of Health (also available in hardcover)
www.epa.gov/glnpo/bnsdocs/merchealth/about-merhealth.html

Mercury Use Reduction & Waste Prevention in Medical Facilities
Educational software for the Web by USEPA Region 5 and Purdue University
www.epa.gov/seahome/mercury/src/title.htm

(Massachusetts) Medical, Academic and Scientific Community Organization (MASCO)
www.masco.org/mercury

Massachusetts Water Resources Authority
www.mwra.state.ma.us

The Wisconsin Mercury Sourcebook contains chapters on Hospitals and Clinics
www.epa.gov/glnpo/bnsdocs/hgsbook/hospital.pdf

ENDNOTES

1. US EPA 1997, "Mercury Report to Congress."
2. National Academy of Sciences National Research Council, July 2000. "Toxicological Effects of Methylmercury."
3. Wisconsin Department of Natural Resources, 1996. 'Mercury in Wisconsin's Environment: A Status Report.'
4. USEPA 1997, "Mercury Report to Congress."
5. Personnel Communication, Western Lake Superior Sanitary District, Duluth, MN